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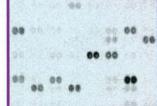


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COVER Newly discovered fossils from the Middle Awash valley of Ethiopia's Afar depression are 2.5 million years old. The remains include the cranium (~21 cm long) with jaw (~10 cm long) of a surprising new hominid species, Australopithecus garhi, as well as antelope limb bones (17.5 cm long) showing that early hominids were butchering large mammals for meat and marrow at this early date. [Photos: © David L. Brill/1999 Atlanta]





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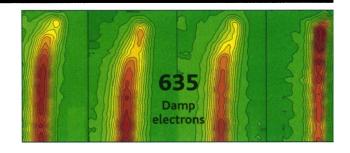
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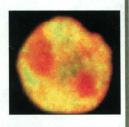
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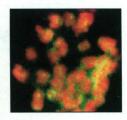
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THIS WEEK IN SCIENCE edited by PHIL SZURONI

MEGAFLOOD BASALT

Flood basalts are large outpourings of magma (up to millions of cubic kilometers) that occur in a relatively short period of time (few million years), such as the Deccan flood basalt, which formed near the end-Cretaceous extinction, and the Siberian flood basalt, which formed during the end-Permian extinction. Marzoli et al. (p. 616; see the Perspective by Olsen) now suggest that perhaps the largest flood basalt province formed 200 million years ago during the major extinction at the Triassic-Jurassic boundary. They dated extensive dikes and other basaltic rocks in North Central Brazil to 200 million years ago and correlated these rocks with other basalts with similar ages spanning the coastal regions of North and South America, Africa, and Europe. Altogether, the volume of the basaltic magma may have been 3 million cubic kilometers.

BARELY SOLVATING AN ELECTRON

Water not only solvates ions but can even solvate single electrons, as occurs when aqueous iodide ions eject their electrons into the solvent during ultraviolet irradiation. Lehr et al. (p. 635) have used femtosecond-resolved photoelectron spectroscopy to determine how small a water cluster is needed to support a solvated electron. Clusters of four water molecules around an iodide ion showed a simple decay after photoexcitation, but clusters with five or six water molecules appeared to rearrange their structure and stabilize the free electron as bulk water does.

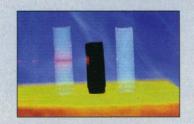
EMERGENCE OF HOMO

The time from 2 to 3 million years ago marks several fundamental developments in human evolution: The first use of tools, expansion of diet to include carnivory, changes in habitat and posture, an increase of brain size, and, finally, the emergence of Homo. Fossils from this critical time have been scarce, however, so it has been difficult to reconstruct much of this history and the phylogeny with confidence. Asfaw et al. (p. 629) now describe a new species of Australopithecus from Ethiopia, based on the remains of a partial cranium, that may be an ancestor of early Homo and descended from A. afarensis. Other remains include a mandible and femur and other postcranial bones (likely from several individuals). de Heinzelin et al. (p. 625; see the cover) show that these fossils date to 2.5 million years ago. They also describe scarred and crushed bones,

which suggest that early hominids were acquiring meat and marrow with primitive tools (see the news story by Culotta).

USE GLUE SPARINGLY

Silica sols can be used to produce microporous materials (aerogels), and a simple route to creating new porous materials would be to use the silica to "glue" other small particles, such as metal colloids or polymer particles, together. However, as often happens in building a model airplane, too much glue is incorporated, and the silica usually coats the other particles com-



pletely. Morris et al. (p. 622) show that drying composite gels of silica sols and metal, oxide, carbon, or polymer particles under supercritical conditions creates nanocomposites that retain the properties of both components. For example, incorporating carbon blacks creates electrically conducting (and optically absorbing) aerogel networks.

HANGING ON TO THE HOST

Latency-associated nuclear antigen (LANA) is a protein encoded by the Kaposi's sarcoma—associated herpesvirus (KSHV) that is commonly expressed in KSHV-infected tumors. Ballestas *et al.* (p. 641) provide evidence that LANA mediates persistence of the viral DNA as an episome (an autonomously replicating element) in infected cells by tethering it to the host chromosomes. Blocking this process might be a new way of preventing or treating these tumors.

LOSING RNA IN A HAIRPIN TURN

Transcription termination is one of the processes used to regulate gene expression, and this process has been simulated in vitro by Yarnell and Roberts (p. 611; see the Perspective by Landick) for an intrinsic *Escherichia coli* terminator. The two termination elements, a U-encoding element and a hairpin structure, promote polymerase pausing and extract RNA from the transcription complex, respectively. In this

context, an antiterminator counteracts termination by inhibiting hairpin formation and, as a result, allows transcription readthrough. A model for intrinsic termination and antitermination is proposed in which the terminator hairpin extracts the nascent RNA from RNA polymerase as the polymerase molecule translocates forward in the absence of RNA synthesis.

T CELL KINASES

Multiple kinases are required to convey signals from lymphocyte antigen receptors. The Tec kinase family member BTK is critical for B lymphocyte antigen receptor signaling. T lymphocytes contain three Tec kinases, but whether they play a role in T cell development and function has been unclear. Schaeffer et al. (p. 638) report that removing one Tec kinase does not render the T cell system impotent, but mice genetically deficient in Tec family members Rlk and Itk had disrupted signaling through phospholipase C, which led to a lack of cytokine production, proliferation, and a defective immune response to Toxoplasma gondii. Thus, Tec kinases are critical for the development of effective T cell function and immunity.

NO NO MEANS YES

How many "safeties" must a system have to prevent inadvertent activation? The cell death pathway initiated by the binding of the cell surface receptor Fas to its ligand has multiple levels of controls built in. The heart of the effector pathway is the caspase protease cascade in which each intermediate protease activates the next protease through cleavage. Mannick et al. (p. 651) found that the zymogen form of caspase-3 is nitrosylated on its catalytic site cysteine and that denitrosylation correlates with caspase activation.

TOO MUCH OF A GOOD THING

Although plants thrive on light, too much light can give the plant a biochemical equivalent of sunburn. When there are not enough of the photosystem molecules responsible for transforming photons into biochemical redox power, the excess energy from light may be expressed as reactive oxygen intermediates that can damage nearby molecules. Karpinski *et al.* (p. 654; see the Perspective by Foyer and Noctor) now show the existence of a component that can move systemically through the plant and signal the need to prepare for more incoming photons, even to leaves still in the shade.

CONTINUED ON PAGE 555



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at Cornell University

As part of a university-wide genomics initiative, Cornell University in partnership with the Boyce Thompson Institute for Plant Research and USDA/ARS is soliciting applications from outstanding candidates for faculty and staff scientist positions in plant biochemistry/metabolism, developmental biology, and genetics. The appointees are expected to form an interactive team utilizing genomic approaches and, as appropriate, the latest techniques in biochemistry, genetics, analytical chemistry, and cell biology. Topics of interest include understanding fundamental mechanisms in plant development or unraveling the catalytic and regulatory pathways by which plants produce, accumulate and recycle primary and secondary metabolites and determining the adaptive and nutritional properties of such compounds.

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Assistant Professor of Plant Developmental Biology: Candidates are sought whose research focuses on the analysis of developmental processes in plants. Those studying the molecular and genetic bases of development and who employ genome-based methodologies will be viewed with particular interest. Contribution to teaching in the area of plant developmental biology is expected. Applicants should send curriculum vitae, statement of research interests, and names of at least three references to: Plant Search Committee, 252 Emerson Hall, Cornell University, Ithaca, NY 14853-1901, attn: Laurie Hanley (ljh4@cornell.edu) phone 607-255-1655; fax 607-255-6683. Position open until filled; review of applications to commence on May 30, 1999.

Assistant Professor of Plant Developmental Biology and Evolution: Candidates are sought whose research deals with the study of plant development, especially in the context of molecular evolution. Preference will be given to candidates with a strong background in molecular and developmental biology and who utilize modern genomic approaches to ask interesting questions in developmental/evolutionary biology. Contribution to teaching in the area of plant developmental biology/evolutionary biology is expected. Applicants should send curriculum vitae, statement of research interests, and names of at least three references to: Plant Search Committee, 252 Emerson Hall, Cornell University, Ithaca, NY 14853-1901, attn: Laurie Hanley (ljh4@cornell.edu) phone 607-255-1655, fax 607-255-6683. Position open until filled; review of applications to commence on May 30, 1999.

Assistant Professor of Plant Breeding/Genetics: Candidates are also sought to develop and direct an innovative program for the genetic improvement of potato using techniques of genomics, cell/molecular biology, genetics, and breeding. The appointee will be a key member of an interdisciplinary group working on pathogen/pest resistance in potato and will interact with other Cornell programs working on genetics/genomics of solanaceous species. Applicants should send a curriculum vitae and statement of research interests, and have at least three references sent to: Potato Search Committee Chair, Department of Plant Breeding, Cornell University, Ithaca, NY 14853-1901. For additional information, see www.plbr.cornell.edu or contact Elizabeth Earle (ede3@cornell.edu), 607-255-3102, 607-255-6683 (fax).

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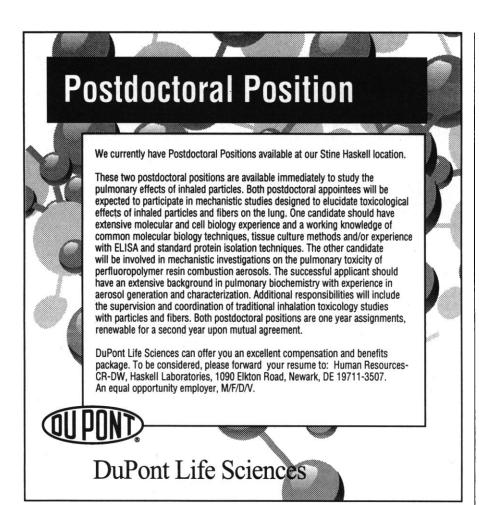
Assistant Scientist: The Boyce Thompson Institute for Plant Research invites applications for a tenure-track scientist who uses genomics or proteomics approaches to study fundamental mechanisms underlying plant biodiversity at the organismal or population levels. Generous start-up funds and excellent facilities are available. Applicants should send a curriculum vitae, statement of research interests, and names of at least three references to:

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Apply by email to Dr. Siegfried Hekimi at postdocs@notung. biol.mcgill.ca or by fax at 514-398-1674. Written applications can be sent to: Anne Wong, Department of Biology, 1205 Dr. Penfield Avenue, Montreal, Quebec, H3A 1B1. Applications should include a CV and names of 3 referees.

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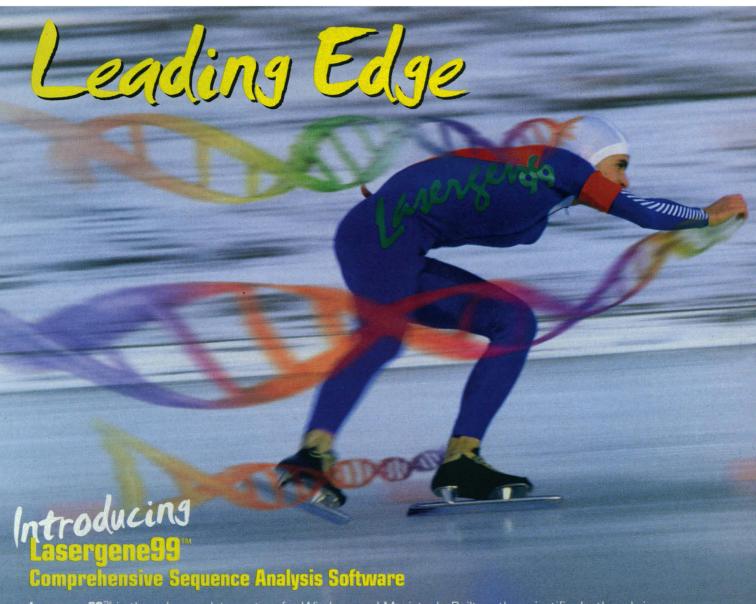
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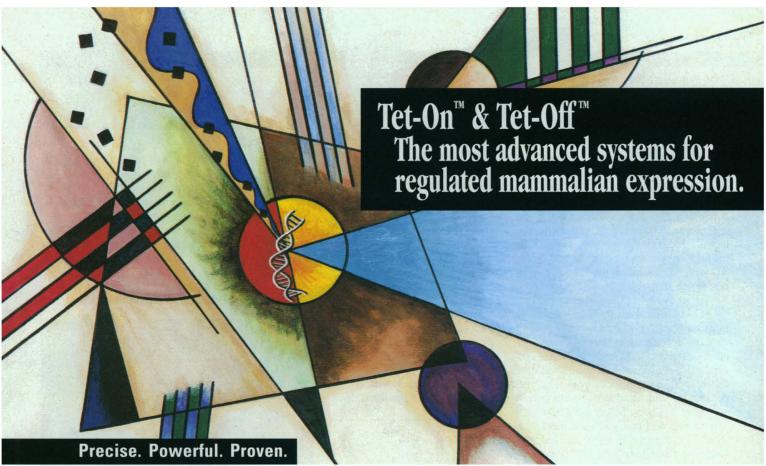
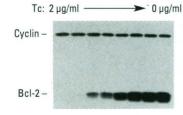


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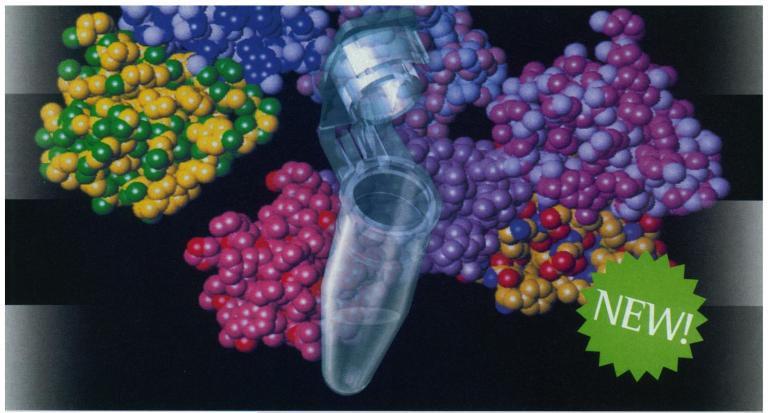
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Background picture: Insuline, computer generated molecular model

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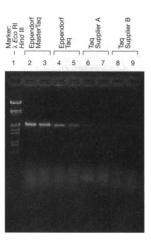


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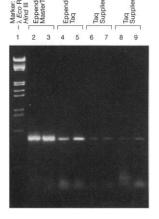
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● Fig.1: Amplification of a SSU rRNA gene from total genomic algae DNA PCR was performed from genomic algae using different Taq DNA Polymerases. Equal volumes of the PCR reactions were analyzed by gel electrophoresis.



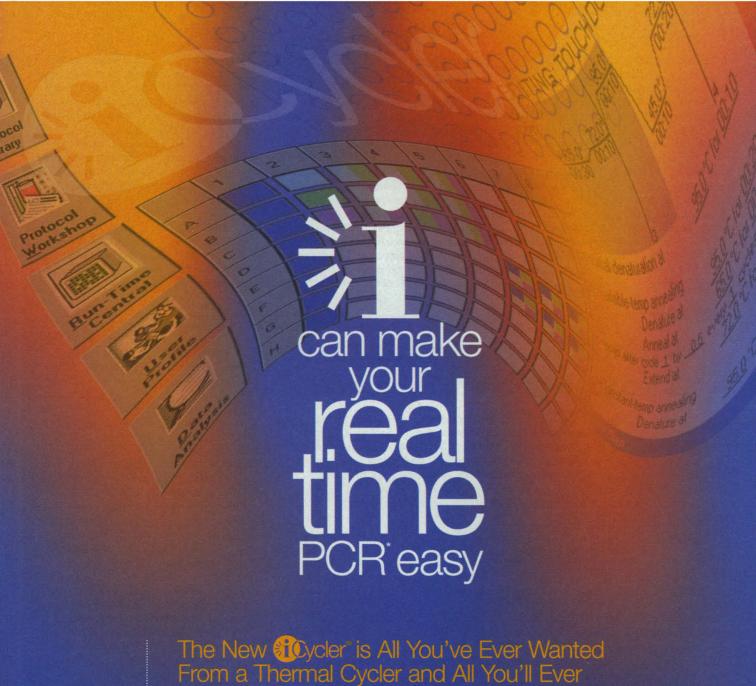
● Fig. 2: Amplification of a GAPDH specific DNA fragment from genomic blood DNA PCR was performed from human genomic blood with different Tag DNA Polymerases. Equal volumes of the PCR reactions were

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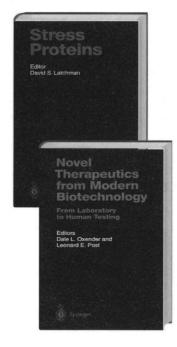
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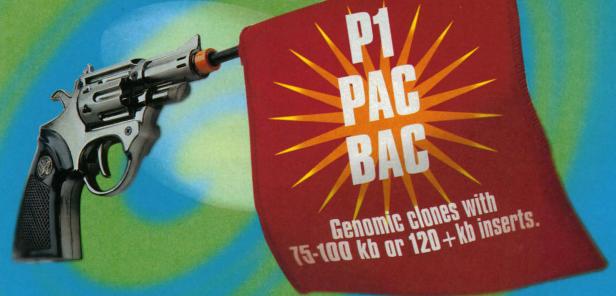
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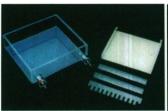
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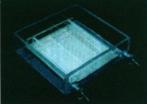
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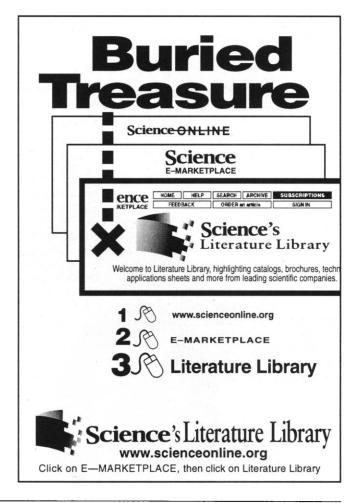


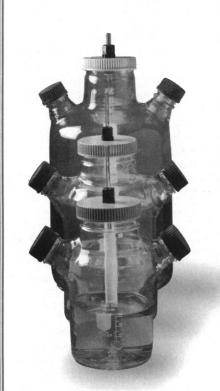
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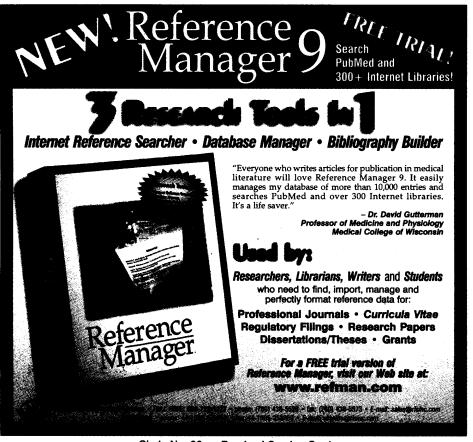
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medical schools. (Early data suggest that the Research Training Fellowships for Medical Schools program is indeed successful in reinforcing interest in research, at least to the point of seeking postdoctoral training.)

Another relevant initiative is the HHMI Biomedical Research Support for Medical Schools program, which awarded \$80 million to 30 medical schools in 1995. Those 4-year grants have provided start-up funding for more than 150 faculty, of whom 33 are M.D.'s or M.D./Ph.D.'s. In addition, 46 M.D.'s and M.D./Ph.D.'s have received funding for pilot projects. A second competition in the year ahead will award \$90 million.

Rosenberg presents compelling data on the relative decline of physician applications to NIH for research grant support, and notes that our physician postdoctoral program data support his concern for the future pool of physician-scientists. While the HHMI data cited show a 57% decline (from 174 to 74 applicants), the actual decline was 45%. The latter figure includes not only M.D. but also M.D./Ph.D. applicants. The actual decline was from 276 (a 5-year high) to 152. Although of definite concern in the context of future trends in the pool of physician-scientists, the numbers are confounded by the increase in K awards by NIH. We see application withdrawals and fellowship declines because of these awards, and will follow closely their future impact on the HHMI program.

Joseph G. Perpich

Vice President, Grants and Special Programs, Howard Hughes Medical Institute, Chevy Chase, MD 20815–6789, USA

CORRECTIONS AND CLARIFICATIONS

The word "innervation" was misspelled as "enervation" in This Week in *Science* of 19 February (p. 1083, column 2, line 13 from the top) and "innervate" as "enervate" in Letters of 8 January (p. 175, column 1, line 8 from the bottom).

In his article "Galaxies seen at the universe's dawn" (News of the Week, 1 Jan., p. 19), Govert Schilling states that the photometric method of measuring the redshift of galaxies was pioneered "a few years ago." In fact, it was pioneered by W. A. Baum, then at the Mount Wilson and Palomar Observatories, in 1957 [Astronom. J. 62, 6 (1957)].

In the map accompanying the Policy Forum "Conservation targets in South American temperate forests" (13 Nov., p. 1271), Uruguay was misspelled.

The Institute for Advanced Study in Princeton, New Jersey, is not "at Princeton University," as was stated in the biographical sketch of Nathan Myhrvold (Essays on Science and Society, 23 Oct., p. 621).

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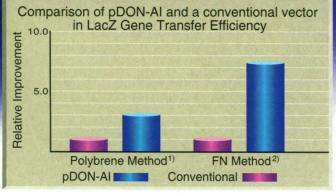
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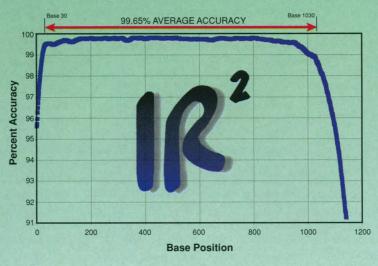
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